

## REMARKS

In view of the above amendments and the following remarks, reconsideration of the objections and rejections contained in the Office Action of June 26, 2007 is respectfully requested.

The Examiner objected to the drawings because they do not include reference number 31 mentioned in the specification. Because reference number 31 is not necessary for a complete and thorough understanding of the invention, the reference number has now been deleted from the specification so as to provide consistency between the specification and the drawings. As a result, it is respectfully submitted that the Examiner's objection to the drawings is now moot.

The Examiner has noted that the original specification contained several errors of form, and has required that the Applicant review the entire specification so as to address all of the formal errors. In view of this request, the entire specification has been reviewed and revised so as to insert necessary section headings and make various editorial corrections, and an abstract has been added. As the revisions are quite extensive, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. For the Examiner's benefit, a marked-up copy of the specification indicating the changes made thereto is also enclosed. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested. In view of the above, it is respectfully submitted that the Examiner's objections to the specification have been overcome.

In items 3-5 of the outstanding Office Action, the Examiner objected to several of the original claims, and rejected all of the original claims under 35 USC § 112, second paragraph, due to various informalities. In view of these formal objections and rejections, all of the original claims have now been cancelled and replaced with new claims 31-46. In particular, the new claims have been drafted so as to specifically address the formal issues raised by the Examiner, and so as to fully comply with all of the requirements of 35 USC § 112. Consequently, it is respectfully submitted that the Examiner's formal objections and rejections are not applicable to the new claims.

The Examiner rejected original claims 16, 18, 19, and 22-24 as being anticipated by the Beazley reference (784,098); rejected claims 16, 17, 18, and 22 as being anticipated by the Rico reference (USP 4,443,196); and rejected claims 25, 26, and 28 as being unpatentable over the Beazley reference. However, as noted above, the original claims have now been cancelled and

replaced with new claims 31-46, including new independent claims 31 and 39. For the reasons discussed below, it is respectfully submitted that the new claims are clearly patentable over the prior art of record.

A brief description of the present invention will now be provided below with reference to various portions of the present application. However, reference to any specific portions of the present application is provided only for illustrative purposes, and is not intended to otherwise limit the scope of the claims to any particular embodiment.

The method of new independent claim 31 comprises inserting a pin into the root, and connecting a flexible pulling element to the pin affixed to root. As explained on page 2, lines 13-14 of the original specification and now recited in the claims, the pulling element comprises a wire, a string, or a rope. As illustrated in Figure 1 and described on page 2, lines 28-34 of the original specification, the pulling element 3 is bent at a substantially right angle along a diverting part 24, and the pulling element 3 is functionally linked to a tensioning device 4. A pulling force is applied to the root via the pulling element 3 using the tensioning device 4 so as to extract the root. As also illustrated in Figure 1, the pulling force is transmitted from a portion of the pulling element at the diverting part 24 to the root via the pulling element 3 in a direction *substantially parallel* to the longitudinal axis of the root (see left side of Figure 1, showing the vertical portion of pulling element extending from the diverting part 24 to the pin 2). The pulling force is also transmitted from the tensioning device 4 to the portion of the pulling element 3 at the diverting part 24 via the pulling element 3 in a direction *substantially perpendicular* to the longitudinal axis of the root (see central area of Figure 1, showing the horizontal portion of pulling element 3 extending from the tensioning support 12 of the tensioning device 4 to the diverting part 24). In other words, the force applied from the tensioning device 4 to the root via the pulling element 3 is diverted from a direction *substantially parallel* to the longitudinal axis of the root to a direction *substantially perpendicular* to the longitudinal axis of the root by the diverting part 24.

As a result of the method described above, a minimal amount of space inside of the mouth is necessary for the root extraction. Furthermore, because the force is applied only partially in a direction parallel to the longitudinal axis of the tooth, there is very little risk of causing damage to the mouth (e.g., to the teeth above the root to be extracted) due to a sudden jerking movement when the root is finally extracted (see page 1, lines 15-22 of the original specification).

The Beazley reference teaches a dental root extractor, including a hook M' at the end of a rod M. In the outstanding Office Action, the Examiner stated that the rod M corresponds to the pulling element of the present invention. However, the rod M clearly does not correspond to a flexible pulling element that comprises one of a *wire, a string, or a rope*. Moreover, the rod M is not bent at a substantially right angle along a diverting part.

Moreover, the pulling force used to extract the root in the Beazley reference is clearly applied only in a direction *parallel* to the longitudinal axis of the root. Therefore, the Beazley reference does not teach any step in which pulling force is transmitted from a tensioning device to a portion of the pulling element at a diverting part via the pulling element in a direction *substantially perpendicular* to the longitudinal axis of the root. Thus, it is respectfully submitted that the Beazley reference does not anticipate or even render obvious new independent claim 31.

The Rico reference teaches a tooth root extractor, in which a screw 8 is held by a lower arm 3 and lifted in a direction parallel to a longitudinal axis of a root by a second arm 2 (see Figure 7). However, the tooth root screw 8 does not comprise a *wire, a string, or a rope*. In fact, the screw must be substantially *rigid* in order to be embedded (screwed) into the root as explained at the top of column 4, lines 1-4 of the Rico reference.

Furthermore, the second arm 2 clearly applies only a lifting force to the screw 8 in a direction *parallel* to the longitudinal axis of the root. Thus, the Rico reference also does not teach or suggest a pulling force transmitted from a tensioning device to a portion of a pulling element at a diverting part via the pulling element in a direction *substantially perpendicular* to the longitudinal axis of the root. As a result, it is respectfully submitted that the Rico reference also does not anticipate or even render obvious new independent claim 31.

New independent claim 39 is directed to an apparatus for extracting a root of a tooth, and the apparatus is capable of performing the method recited in new independent claim 31. In particular, the apparatus of claim 39 comprises a diverting part, a tensioning device, and a flexible pulling element connected to a pin to be affixed to the root. The pulling element comprises one of a wire, a string, or a rope bent at a substantially right angle along the diverting part, and the pulling element is functionally linked to the tensioning device. Furthermore, the pulling element is bent along the diverting part so as to transmit a force generated by the

tensioning device from a portion of the pulling element at the diverting part to the root in a direction substantially parallel to the longitudinal axis of the root, and so as to transmit the force from the tensioning device to the portion of the pulling element at the diverting part in a direction *substantially perpendicular* to the longitudinal axis of the root.

As explained above with respect to new independent claim 31, the Beazley reference and the Rico reference do not disclose or suggest a flexible pulling element comprising one of a *wire, a string, or a rope*. Furthermore, the pulling elements of the Rico reference and the Beazley reference are not bent at a substantially right angle along a diverting part. Finally, the Rico reference and Beazley reference do not teach or suggest a pulling element which is bent so as to transmit a pulling force from a tensioning device to a portion of the pulling element at a diverting part in a direction *substantially perpendicular* to a longitudinal axis of the root. Consequently, it is submitted that the Beazley reference and the Rico reference do not anticipate new independent claim 39, and do not render new independent claim 39 obvious, either alone or in combination.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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## Method as well as device for extraction of a root

### BACKGROUND OF THE INVENTION

The invention relates to a method for extracting a root, according to the main description of Claim 1, as well as a device for applying the method.

In dental technology it is common that during the extracting of a tooth and following the administering of a local anaesthetic, the root is first loosened somewhat inside the gum with a tool that is pushed into the periodontal gap, and the tooth is then pulled out with pliers together with the root. This does however become problematic if the tooth is a broken one or if the same is covered with a crown, where practically no grip surface is available for the pliers, and if only the root alone is to be extracted.

It is the purpose of this invention to provide a method for the simple extraction of a root and a device for applying the method.

### SUMMARY OF THE INVENTION

This task is solved in accordance with the invention by a method with the characteristics of Claim 1 as well as and a device for applying the method according to Claim 8.

Further preferred embodiments of the method of this invention as well as the device of this invention form the subject of the subclaims following description.

The fact that a pin is inserted into the root and affixed there for extracting the same, whereafter, Then, a pulling element functionally linked with a manually activatable tensioning device is inserted into the pin, and that subsequently, Subsequently, the pulling force required for extracting the tooth is created and applied to the root substantially in the axial direction of the same by means of the supported tensioning device partially inserted into the mouth means that, Thus, a relative large pulling force can be applied to the root without excessive need of excessive force and without space problems and possibly a risk of possible injury within the mouth. The device of this invention is simple and cost-effective, and enables easy handling.

### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be explained with reference to the drawings, whereby:

Fig. 1 shows a longitudinal cross-section of an embodiment of a device of this invention for extracting a root;

Fig. 2 shows an overview of the device illustrated in Fig. 1;

Fig. 3 shows a cross-sectional view along the line III-III in Fig. 1; and

Fig. 4 shows a threaded pin as part of the device of this invention, with a counter piece for screwing the threaded pin into the root.

### DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows a device 1 for extracting a root, incorporating a pin 2 that can be inserted into the root and affixed there, a pulling element 3 that can be inserted into the pin 2, and a tensioning device 4 functionally linked with the pulling element 3.

The pin 2 of the embodiment illustrated here takes the form of a threaded pin which is screwed into the tooth, root, preferably in the direction of its axis. However, other means for affixing the pin 2 to the tooth root could, be envisaged (this could, for example, consist of a cement or adhesive connection or an expanding pin). In addition, and the inserting insertion in the direction of the axis of the root is sometimes not possible, or no longer possible, for example when the root is not straight or is already equipped with one or two screws for the fitting of a crown.

The pin 2 is equipped with a bead 5, which is in turn equipped with a hook-shaped recess 6. As indicated in Fig. 4, the head 5 is preferably equipped with an external shape (square) of the type that makes it possible to screw a standardised standardized adapter 7 into the root, onto which the head 5 can be affixed.

The pulling element 3 already mentioned above is then hooked into the hook-shaped recess 6 with a cross pin 8. The pulling element 3 can, for example, take the form of a flexible element such as a wire, a string, or a rope. At the other end of the pulling element 3, a cross pin 9 is also provided, with which the pulling element 3 can be affixed to the tensioning device 4 as is described in more detail below.

The tensioning device 4 incorporates a stretched base body 10 which, in turn, ~~incorporates has a guide nut-groove~~ 11 with a T-shaped cross section for a tensioning support 12 that is longitudinally adjustable in relation to the base body 10. A threaded bolt 15 extending in a longitudinal direction ~~is-has a front end 15a~~ screwed into the tensioning support 3.2 ~~with a front end 15a~~, whereby ~~the-a~~ rear threaded part 15b is guided through a support sleeve 16 screwed onto the rear end of the base body 10 by means of screws 14. A ribbed nut 20 is ~~affoeated~~ provided on the threaded part 15b, the same being supportable at a rear facing surface 17 of the support sleeve 16. The tensioning support 12 can be supported in its longitudinal direction with a rear surface 21 ~~upon-against~~ a front facing surface 18 of the support sleeve 16 on the one hand, and with a surface 22 ~~directed-located~~ towards the front ~~on-against~~ a front base body part 10a on the other hand.

The tensioning support 12 is equipped with a number of hook-shaped recesses 23 arranged ~~behind-eachon behind~~ the other in longitudinal direction, ~~into-onto~~ which the pulling element 3 can be hooked with the cross pin 9. A diverting part 24 for the pulling element 3 is affixed to the front base body part 10a, ~~on-which the~~ The pulling element 3 ~~which~~ is held to extend substantially in an axial direction of the root in relation to the pin 3 on the one hand, and ~~is also tensioned at a right angles-angle~~ to the axial direction of the root same in a longitudinal direction of the tensioning device 4 on the other hand, ~~and rests on the diverting part 24~~. The diverting part 24 takes the form of a firmly affixed disc segment, the cross section of which forms a guide nut 24a for the pulling element 3, ~~and the same-being~~ pulling element 3 is affixed in a front side, fork-shaped part 25 of the front base body part 10a by means of a cross pin 26.

On the side that faces away from the guide groove 11 for the tensioning support 12, the base body 10 is equipped with a groove 27 with a dovetail cross-section (see especially Fig. 3), into which a support plate 28 made of plastic is inserted. The front base body section 10a also incorporates a groove 29 for receiving a rotating segment 30 ~~as~~ illustrated in Fig. 1 on the same side of the base body 10, ~~and the axis of which-the segment 30 extends diagonally with respect to~~ the displacement direction of the tensioning support 12, and ~~which-the segment 30 can be~~ inserted from the side into the groove 29, ~~whereby~~. The groove 29 forms the guide surfaces for an external as well as an internal circumference surface 31,32~~32~~ of the rotating segment 30.

For this, the groove 29 is placed in the front base body section 10a in such a way that the pulling element facing-extending to the pin 2 extends coaxially in relation to the rotating segment 30. The rotating segment 30 forms a cut-out defined by surfaces 34, 35, whose alignment can be changed, i.e. adjusted by turning the rotating segment 30. The rotating segment 30 is – much like the base body 1.0 with the support plate 28 – equipped with a support disc 38 made of plastic, which is inserted into a groove 37 of the rotating segment 30 with a dovetail cross-section (Fig. 1). The support plate 28 and the support disc 38 each form have a resting surface 28a, 38a for supporting the tensioning device 4 in the mouth.

When a root is to be extracted, the pin 2 is first inserted into the root and affixed there, preferably screwed into the same. One end of the pulling element 3 is then inserted into (attached to) the pin 2, for example by being hooked into the recess 6 with the cross pin 8, and affixed to the tensioning device 4 that has been inserted into the mouth and is partially supported there with the other end. With the selection of a suitable recess 23 for hooking into therein the other cross pin 9, the position of the location in the mouth that is to be treated; (i.e., the distance between the supporting point of the tensioning device in the mouth and the root to be extracted) must be considered and a suitable pre-tensioning of the pulling element 3 created. The position of the tensioning support 12 between the front base body part 10a and the front facing surface 18 of the support sleeve 16 as sets the starting position prior to creating the actual pulling force for extracting the root, and can also be quickly adjusted by means of axially adjusting the ribbed nut 20 to suit the threaded part 15b. With a the rear surface 21 of the tensioning support 12 abutting against the front facing surface 18 of the support sleeve 16, with the rear surface 21 the axial distance of the ribbed nut 20 from the rear facing surface 17 of the support sleeve 16 determines the path along which the tensioning support 12 can be quickly moved in a longitudinal direction without rotating the ribbed but-nut 20. The actual pulling force for extracting the root is then created by a the ribbed nut 20 abutting against the rear facing surface 17 of the support sleeve 16 by turning the same nut 20, and the subsequently created slow adjustment of the threaded part, i.e. tensioning support. For this, it is of advantage that a relatively large pulling force can be created via the thread without excessive force. In addition, the diverting (directional change) of the pulling element 3 and the right-angled arrangement of the tensioning support 12 in relation to the

pin 2 affixed into-onto the root means that the root is pulled substantially in the direction of the axis of the same-root without creating space problems and/or a possible risk of injury within the mouth.

The support of the tensioning device 4 is carried out by means of the support surface 28a of the support plate 28 (on the edge of the mouth) and via the support surface 38a of the support disc 38 affixed to the rotating segment 30 (for the location to be treated). The turnable rotating segment 30 can be adjusted to suit the relevant local conditions around the location that is to be treated in order to guarantee optimised-optimized support.

The fast adjustment of the tensioning support 12 already mentioned, which is limited in its maximum size by the abutment of the tensioning support 12 against the support sleeve 16 on one side, and by the front base body section 10a on the other side, whereby the size can be adjusted; (i.e. reduced by means of the ribbed nut 20;) can also be used for pre-treating; i.e. loosening In other words, the root in that can be loosened by a reciprocal movement of the tensioning support applies to apply a sudden impact force on the root prior to applying the actual pulling force. It is of course also possible when required to carry out a loosening in the periodontal gap by means of a suitable tool in the known way.

The device of this invention is simple and cost-effective, and enables easy handling. The base body 10 of the tensioning device 4 can for example be held with the thumb and middle finger of one hand, whereby the index finger supports the positioning of the pulling element 3 on the diverting part 24, and the ribbed nut 20 is activated with the other hand. In principle, the pulling force could also be applied mechanically.

It is possible to envisage means which effect a sudden impact upon the pulling element 3 during the turning of the ribbed nut 20; for example, in that the facing surface 17 of the support sleeve 16 and the ribbed nut abutting against the same 20 are-can be equipped with corresponding radially extending saw teeth or suchlike. During the turning of the ribbed nut, an additional increase can therefore be created across a certain angle, which is then decreased again.

ABSTRACT

The invention relates to a method for extracting a root, whereby the root is extracted following a possible initial loosening of the root within the periodontal gap. A pin is inserted into the root and affixed there, whereafter a pulling element functionally linked with a tensioning device is connected with the pin. The pulling force required for extracting the root is subsequently applied to the root substantially in the direction of the axis of the tooth by means of the tensioning device that has been partially inserted into the mouth and supported there.